Volunteer Lake Assessment Program Individual Lake Reports

PAWTUCKAWAY LAKE, NOTTINGHAM, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	13,248	**Max. Depth (m):**	15.2	**Flushing Rate (yr^{-1}):**	2.3
Surface Area (Ac.):	900	**Mean Depth (m):**	2.9	**P Retention Coef:**	0.61
Shore Length (m):	27,700	**Volume (m^3):**	10,740,000	**Elevation (ft):**	250

TROPHIC CLASSIFICATION

Year	Trophic class
1989	MESOTROPHIC
1998	MESOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

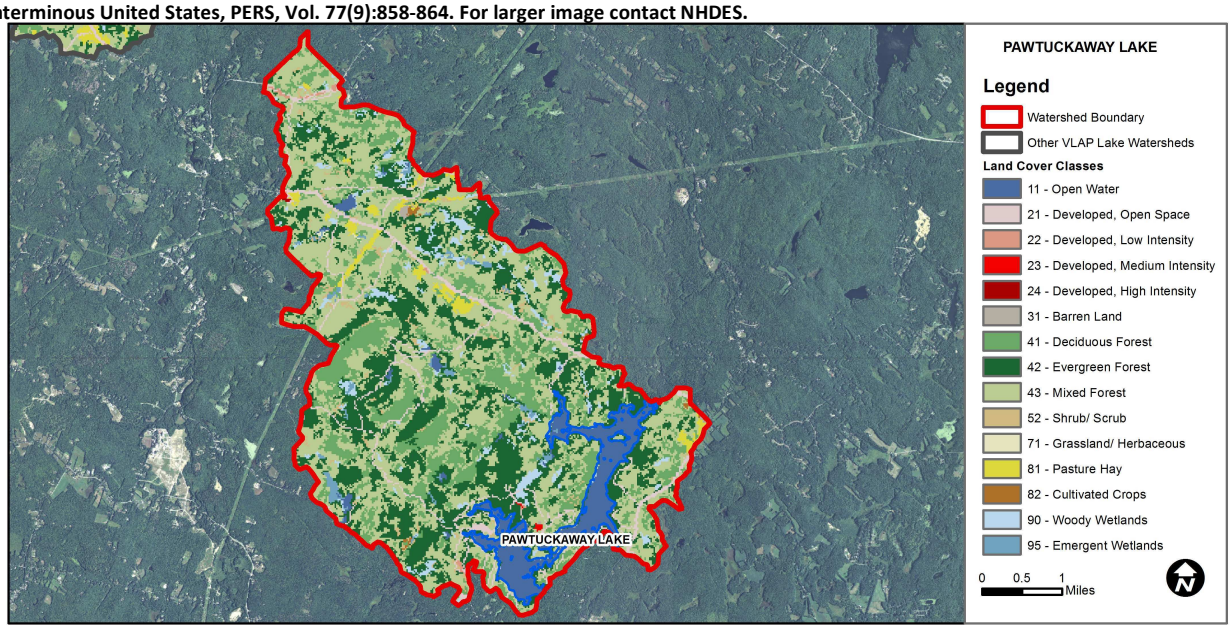
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	>/=5 samples and median is >threshold.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	D.O. (mg/L)	Good	At least 10 samples with 1 sample but < 10% of samples exceeding criteria.
	D.O. (% sat)	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Chlorophyll-a	Slightly Bad	>5 samples and median is > threshold.
Primary Contact Recreation	E. coli	No Data	No Data for this parameter.
	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Good	At least 10 samples with 1 sample but < 10% of samples exceeding criteria.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

PAWTUCKAWAY LAKE - TOWN BEACH	E. coli	Bad	>/=1 exceedance(s) of geometric mean criterion and/or >/=2 exceedances of single sample criterion, with 1 or more >2X criteria.
PAWTUCKAWAY LAKE - PAWTUCKAWAY STATE PARK BEACH	E. coli	Bad	>/=1 exceedance(s) of geometric mean criterion and/or >/=2 exceedances of single sample criterion, with 1 or more >2X criteria.
PAWTUCKAWAY LAKE - PAWTUCKAWAY STATE PARK BEACH	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.

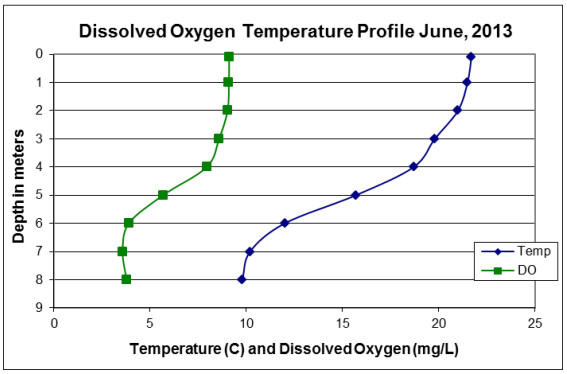


Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	6.52	Barren Land	0.09	Grassland/Herbaceous	0.06
Developed-Open Space	4.12	Deciduous Forest	16.26	Pasture Hay	1.5
Developed-Low Intensity	0.19	Evergreen Forest	26.59	Cultivated Crops	0.16
Developed-Medium Intensity	0.05	Mixed Forest	38.87	Woody Wetlands	3.15
Developed-High Intensity	0.02	Shrub-Scrub	1.49	Emergent Wetlands	0.92

VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
PAWTUCKAWAY LAKE, NORTH STN, NOTTINGHAM, NH
2013 DATA SUMMARY

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **CHLOROPHYLL-A:** Chlorophyll levels were slightly elevated in May and July and were lowest in September. Average summer chlorophyll was consistent with 2012 and historical trend analysis indicates relatively stable chlorophyll with moderate variability between years.
- **CONDUCTIVITY/CHLORIDE:** Deep spot, Back Creek B, Fundy Bk., and Round Pd. Bk. conductivity and chloride levels were low to average. Conductivity and chloride were elevated in Fernalds Bk. due to agricultural activities, and slightly elevated in White Grove Brook. Historical trend analysis indicates relatively stable epilimnetic conductivity with moderate variability between years.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was slightly elevated, particularly in July following significant storm events. Metalimnetic phosphorus was slightly elevated in September, and hypolimnetic phosphorus was greatly elevated July through September. Historical trend analysis indicates significantly increasing (worsening) epilimnetic phosphorus since monitoring began. Back Creek B, Fundy Bk., and Round Pond phosphorus were average for those stations. White Grove Bk. phosphorus was elevated in June following significant storm events and severe sedimentation was noted in field data. Phosphorus levels in Fernalds Bk. continue to be elevated.
- **TRANSPARENCY:** Viewscope transparency was relatively stable throughout the summer and was deepest in September when chlorophyll levels were lowest. Volunteers switched to utilizing the viewscope method to measure transparency (2007-2013); therefore we need at least ten consecutive years of data to conduct statistical trend analysis of viewscope data.
- **TURBIDITY:** Epilimnetic turbidity was low throughout the summer. Metalimnetic turbidity was slightly elevated in July when chlorophyll levels were greatest. Hypolimnetic turbidity was elevated in July. Turbidity was low in Back Creek B, Fundy Bk. and Round Pond Bk. White Grove Bk. turbidity was elevated in June following significant storm event. Fernalds Bk. turbidity was greatly elevated in July following significant storm events.
- **PH:** Deep spot, Back Creek B, Fundy Bk., Round Pond Bk., and White Grove Bk. pH levels were less than desirable range 6.5 – 8.0 units and potentially critical to aquatic life. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.
- **RECOMMENDED ACTIONS:** Tributary samples were collected following significant storm events in June and July. White Grove Bk., Round Pond Bk., Back Creek B, and Fundy Bk. experienced severe sedimentation as noted on field data sheets. Identify areas of erosion along these tributaries and install best management practices to reduce erosion during storm events. Consult a Certified Erosion Control Specialist for assistance. Educate and work with property owners to reduce erosion and stormwater runoff from their properties. DES' "Homeowner's Guide to Stormwater Management" is a useful tool. Continue watershed education and outreach efforts to reduce phosphorus loading to offset the internal phosphorus load from the hypolimnion.



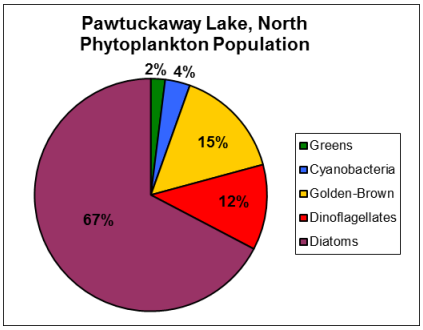


Table 1. 2013 Average Water Quality Data for PAWTUCKAWAY LAKE, NORTH

Station Name	Alk.	Chlor-a	Chloride	Cond.	Total P	Trans.	Turb.	pH
	mg/l	ug/l	mg/l	uS/cm	ug/l	m	ntu	
						VS		
#09 Fernalds B			32	230.5	1535		5.36	6.93
Back Creek B			10	48.2	26		0.81	6.36
Fernalds A			31	222.0	1813		3.21	6.94
Fundy Brook			7	41.7	31		0.72	5.08
North Epilimnion	5.76	5.23	6	43.9	16	3.72	0.77	6.73
North Metalimnion				45.7	16		0.90	6.15
North Hypolimnion				52.4	67		5.09	6.14
Round Pd Brook			3	27.6	18		0.77	6.22
White Grove Brook			21	82.8	29		4.71	6.26

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: < 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
pH	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
Conductivity	Stable	Trend not significant; data moderately variable.	Transparency	N/A	Additional viewscope data necessary.
			Phosphorus (epilimnion)	Degrading	Data significantly increasing.